REMARKS

This RCE submission is in response to the Final Office Action dated June 9, 2010, the Advisory Action dated October 1, 2010, and in lieu of an appeal brief pursuant to 37 C.F.R. § 1.114(d). Claims 1-20 remain pending in the application and stand rejected.

Applicant has amended claims 1-7, 10-15, and 18-20 to more clearly recite aspects of the invention. Applicant has also amended claim 16 to present its subject matter in independent form. No new matter has been added.

Entry of the foregoing amendments and reconsideration of the claims in view of the following remarks is respectfully requested.

Claim Rejections – 35 U.S.C. § 103

Claims 1-20 stand rejected under 35 U.S.C. § 103(a) as being obvious over a single reference, Rudd, III (U.S. Patent Application Publication No. 2004/0220714; hereafter "*Rudd*"). The examiner asserts that *Rudd's* wheel speed sensors (W_s 118) are configured to input a signal to an acceleration controller (108) and correspond to Applicant's claimed accelerometer that is configured to measure a deceleration and output a deceleration signal. *See* Final Office Acton of June 9, 2010, pp. 3-4. The examiner further asserts that *Rudd's* "deceleration module having signals (104)" corresponds to Applicant's claimed brake controller that is configured to receive a plurality of deceleration signals from the accelerometer and calculate a change in measured deceleration over time from those signals. *Id.*

Applicant has amended base claims 1 and 2, obviating the rejection. At the very least, *Rudd* does not teach, show, or suggest measuring a linear deceleration of a vehicle body or calculating a change in linear deceleration over time, as now required in claims 1 and 2. In contrast, *Rudd* uses the rotational speed/velocity of a wheel to determine the deceleration of the wheel. *See* Para. [0037]; Claim 1. The rotational velocity of a wheel is not indicative of nor can it predict the deceleration of the vehicle body, as claimed. Although attached to the body, the wheels of a vehicle often rotate slower than the vehicle body, a/k/a skid or slip, while the vehicle body decelerates but remains in motion.

Referring to *Rudd*, and the Applicant agrees, the appropriate amount of wheel skid is often illustrated with a mu-slip curve, where the vertical axis represents the coefficient of friction μ (mu) and the horizontal axis represents the slip ratio. *See*, Para. [0007]. A slip ratio of zero indicates that the wheel is not skidding at all, *i.e.*, free rolling, and a slip ratio of one indicates that the wheel is fully locked and has no rotation. *Id.* Any slip ratio between zero and one means that the rotational velocity of the wheel is less than the linear velocity of the vehicle body. Maximum braking ability occurs at the peak of the mu-slip curve, which is generally between about a 0.05 and 0.25 slip ratio, depending on multiple variables, *e.g.*, surface slickness, crosswind, temperature, tire pressure, etc. *See*, Para. [0008]. Traditional antilock brake systems (ABS) are specifically designed to allow about a 0.10 slip ratio under all conditions, regardless of the location of the peak of the mu-slip curve. *Id.* An ideal braking system, however, will target the peak of the mu-slip curve as it varies due to the variables, thereby providing maximum braking ability. *Id.*

Neither a rotational velocity of the wheel nor a rotational deceleration of the wheel, as disclosed in *Rudd*, can accurately predict or measure the linear velocity or deceleration of the vehicle body. This is because the rotational velocity of a skidding wheel will be less than the linear velocity of the vehicle body, and the difference will be exacerbated based on the degree of slippage. Among other things, Applicant's claimed invention overcomes this problem by measuring the deceleration of the vehicle body, rather than the rotational velocity of its wheel that is subject to varying degrees of skid depending on the multitude of variables described above. Such is not taught, shown, or suggested by *Rudd.*

Further explanation is provided with reference to the illustrative mu-slip graph below (Figure 1). This graph includes two mu-slip curves. The top curve represents ideal conditions where the maximum (peak) μ value occurs at about a 10% slip ratio. The bottom curve represents non-ideal conditions, such as where a crosswind or icy conditions exist. Due to the impact of the crosswind/ice, the maximum (peak) μ value is reduced and occurs at a slip ratio greater than 10%. In such conditions, traditional ABS systems, which use a fixed 10% slip ratio, will not achieve the peak μ value. The *Rudd* system, which only takes into account forces in the direction that the wheel rotates, *i.e.*, the longitudinal direction of the wheel (see Figure 2 below), is an improvement upon traditional ABS systems, but still does not achieve the peak μ value

because it does not take into account lateral forces, such as a crosswind or slippage due to ice. Since Applicant's claimed system concerns the deceleration of the vehicle body, as opposed to merely a wheel, it can take into account both longitudinal and lateral forces, *e.g.*, a net force, acting on the vehicle body. See Figure 2 below that depicts both longitudinal and lateral forces on a vehicle body. Applicant's claimed system is able to target and achieve the peak μ value in varying conditions when the vehicle body moves in both longitudinal and lateral directions, which are almost always experienced during slippage. *Rudd* and traditional ABS systems simply do not recognize or account for the effect of lateral forces on a braking system.

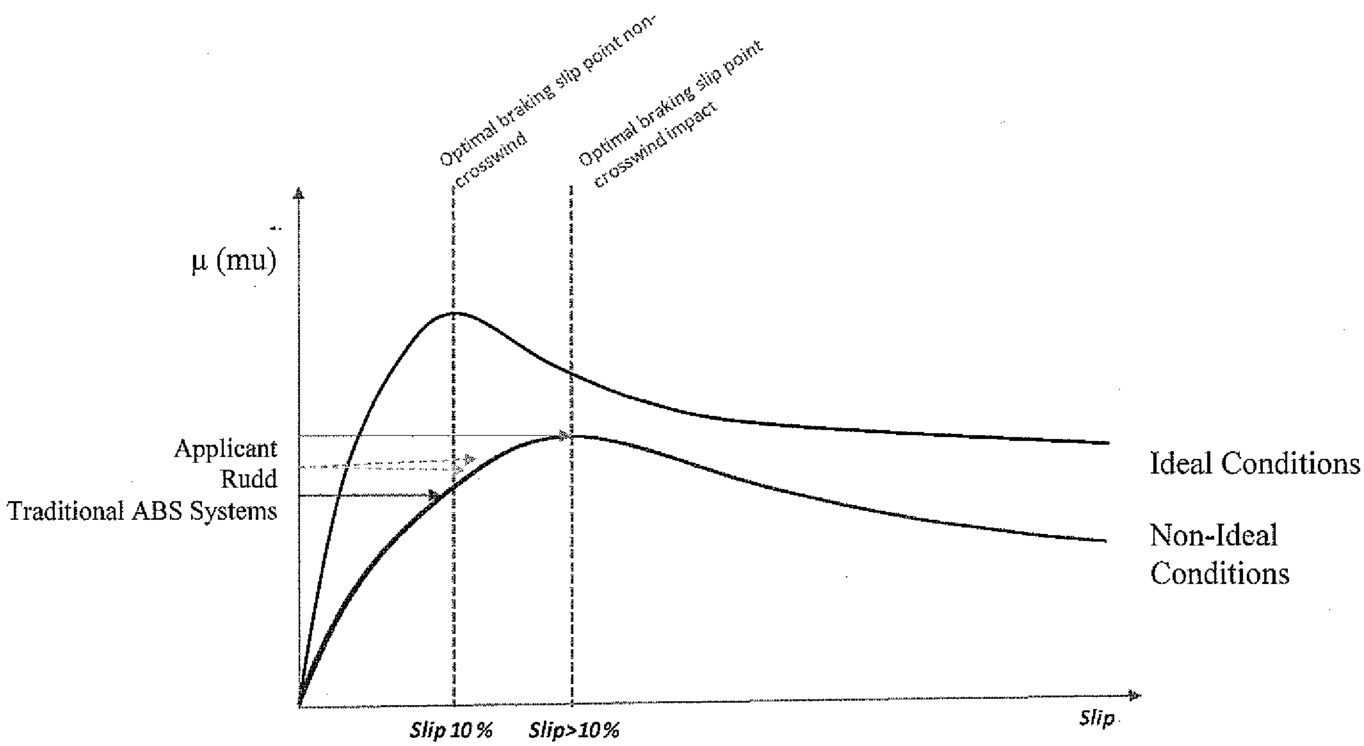
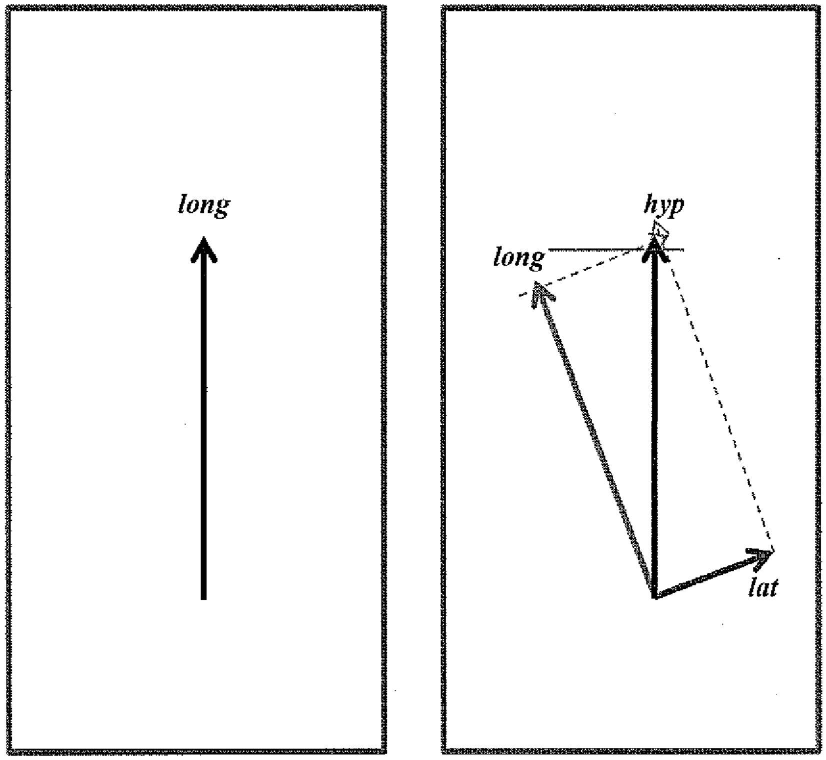


Figure 1



Non-crosswind ("ideal conditions") Crosswind impact

Figure 2

Furthermore, *Rudd* does not teach, show, or suggest calculating a change in vehicle deceleration over time, as required in claims 1 and 2. Applicant has discovered that calculating a change in deceleration over time, a/k/a. jerk, can be used to maximize braking performance. *See* Applicant's Paras. [0033], [0072], and [0073]. Brake performance is maximized when the friction force between the wheels and the ground approaches a peak friction point. *Id.* The brake performance increases as the friction force approaches the peak friction point. *Id.* However, when the peak friction point is exceeded, the wheels begin to skid, and brake performance rapidly decreases. *Id.* With this in mind and by way of example, if the change in the measured deceleration over time is increasing, the peak friction point has not yet been reached. *Id.* This means that brake pressure can be increased, which increases the friction force between the wheels and the ground, and thereby increases deceleration of the vehicle. *Id.* If the change in measured deceleration over time is decreasing, the peak friction point has been exceeded and the wheels are skidding. *Id.* This means that brake pressure must be decreased

until the friction force between the wheels and the ground falls below the peak friction point or braking will not be maximized and control of the vehicle will be severely compromised. *Id.*

As explained above, *Rudd* calculates a change in the measured rotational velocity over time, *i.e.*, deceleration of a wheel. *See* Paras. [0046], [0067]. Jerk is not deceleration and *vice versa*. Rather, jerk is the first derivative of deceleration, *i.e.*, j = da/dt where a is acceleration/deceleration and t is time. Indeed, *Rudd* makes no mention or suggestion of jerk because jerk is not used in the measurements or calculations of *Rudd's* braking process. Accordingly, *Rudd* does not teach, show, or suggest calculating a change in deceleration over time, as required in claims 1 and 2. For any of the foregoing reasons, withdrawal of the rejection and allowance of the claims is respectfully requested.

Claims 3 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Rudd* in view of Murphy (U.S. Patent No. 5,951,122; hereafter "*Murphy*"). Applicant respectfully traverses the rejection for the same reasons above. *Murphy* does not cure the deficiencies of *Rudd*. And since claims 3 and 10 include all the limitations of claims 1 or 2, claims 3 and 10 are allowable for at least the same reasons. Withdrawal of the rejection and allowance of claims 3 and 10 is respectfully requested.

Claims 12, 16, 18, and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Rudd* in view of Cleary (U.S. Patent No. 4,454,582; hereafter "*Cleary*").

Applicant respectfully traverses the rejection for the same reasons above with regard to claims 1 and 2. *Cleary* does not cure the deficiencies of *Rudd*. And since claims 12, 16, 18, and 19 include all the limitations of claims 1 or 2, those claims are allowable for at lease the same reasons. Withdrawal of the rejection and allowance of claims 12, 16, 18, and 19 is respectfully requested.

CONCLUSION

Having addressed all issues set out in the Office Action, Applicant respectfully submits that the pending claims are now in condition for allowance. Applicant invites the examiner to telephone the undersigned attorney if there are any issues outstanding which have not been addressed to the examiner's satisfaction.

Respectfully submitted,

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Date

/Robb D. Edmonds/
Robb D. Edmonds
Attorney for Applicant
Registration No. 46,681

EDMONDS & NOLTE, PC
16815 Royal Crest Drive
Suite 130
Houston, Texas 77058
Phone: 281-480-2700
Fax: 281-480-2701